

**State of California**  
Department of Food and Agriculture  
Division of Measurement Standards

Certificate Number: 5308-02

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***California Type Evaluation Program***  
***Certificate of Approval***  
***for Measuring Devices***

**For:**

Coriolis Mass Flow Meter  
Digital Electronic  
Apollo Series  
Sensor Model: A400  
Mass Flow Transmitter Model: AFT100  
Mass Flow Rates: 500 - 7 000 lb/min  
Volume Flow Rates: 60 - 840 gal/min

**Submitted by:**

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**Standard Features and Options**

Model numbers are followed by suffixes indicating various non-metrological options provided.

**Standard Features:**

- 36L Stainless steel dual flow tubes
- 304 Stainless steel sensor housing
- Integral mount, NEMA 4-IP66, explosion-proof transmitter housing
- Programmable transmitter
- HART® Communications Protocol for interface to HART® Communicator or Host System (Serial Communication Selectable for either RS485 or RS232)

**Options:**

- Two line, 16 character, back-lighted, LCD display with three button user interface
- Remote mount, NEMA 4-IP66, explosion-proof transmitter housing with 10', 20', or 50' cable

This device was evaluated under the California Type Evaluation Program (CTEP) and was found to comply with the applicable technical requirements of California Code of Regulations for "Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages.

Effective Date: July 2, 2002

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Mike Cleary, Director

**FMC Measurement Solutions**  
**Coriolis Mass Flow Meter**  
**Model: Apollo Series**

**Application:** For use in stationary installations. This device may be used to measure normal liquids with a specific gravity of 1.0. The mass flow transmitter without a display must be used with an approved digital indicator or host computer system.

**Product:**

Product Group	Typical Product*	Specific Gravity
Normal Liquids	Water, Alcohols, Glycols, Water Mixes thereof, Agricultural Liquids, Fertilizers, Chemicals, Petroleum Products, Solvents, Herbicides, and Suspensions	1.0

**\*NOTE:** Not all "Typical Products" listed in this table are covered by this certificate. Only those products falling within the specific gravity range listed in the last column are covered. Some products may have a specific gravity that falls into more than one group. Only products which fall into the product groups ***and*** specific gravity ranges listed in this table are covered by this certificate.

**Identification:** The identification badge for the sensor is a stainless steel plate spot welded on the side of the sensor housing. The identification badge for the flow transmitter is a stainless steel plate riveted to the top of the transmitter housing.

**Sealing:** Device is Category 2: Remote configuration capability, but access is controlled by physical hardware. The flow meter tubes are completely enclosed in a welded stainless steel housing. A switch on one of the circuit boards enables access (via a HART® communicator, host computer system, or the optional display/interface) to the configuration, calibration, and diagnostics mode of the flow transmitter. A separate internal zero switch controls the zero function. The flow transmitter housing is physically sealed by threading a wire security seal through holes in both threaded end caps. The optional display/interface is password protected.

**Operation:** Four programmable output signals are provided as standard. Two selectable analog signals, 4-20mA or 0-20mA, can be independently configured for mass flow, volume flow, temperature, and density. Two outputs, 0 to 10KHz, or pulse selectable, can be programmed for mass or volume flow. For added signal transmission security, the frequency outputs can be defined to operate in continuous phase quadrature mode. A control output is also available for remote indication of zero in progress, flow direction, or a flow meter fault condition. Mass flow and volume flow can be independently assigned low flow cutoff values. Independent, resettable totalizers and non-resettable inventory totals are provided for both mass and volume. Totalizer and inventory operate in forward, reverse, or bi-directional flow with add or subtract functionality in bi-directional mode.

**Test Conditions:** The emphasis of the evaluation was on the performance and operation of the mass flow meter operating in a stationary mounted installation. The examinations were conducted at the manufacturer's facility. The device was tested, using water as the test liquid (specific gravity of 1.0), at flow rates of 500, 2 200, 3 900, and 5 600 pounds per minute. The device was then reconfigured to indicate volume flow and was tested, using water as the test liquid (specific gravity of 1.0), at flow rates of 60, 264, 468, and 672 gallons per minute. The device was then sealed. After a throughput of 11 556 287 pounds (1 387 084 gallons), the device was tested using water at the same flow rates as the initial tests. Temperature of the test liquid was 21.2 °C to 21.5 °C throughout all testing.

Results of the evaluation indicate the devices comply with applicable requirements.

**Type Evaluation Criteria Used:** Title 4, California Code of Regulations, 2002 Edition

**Tested By:** J. Raspino (CA)